

CLAIMS

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C1

1. ~~An isolated nucleic acid fragment comprising a~~
nucleic acid sequence encoding a fatty acid desaturase
or a fatty acid desaturase-related enzyme with an amino
acid identity of 50% or greater to the polypeptide
encoded by SEQ ID NOS:1, 4, 6, 8, 10, 12, 14 or 16.
2. The isolated nucleic acid fragment of Claim 1
wherein the amino acid identity is 65% or greater to the
polypeptide encoded by SEQ ID NOS:1, 4, 6, 8, 10, 12, 14
or 16.
3. The isolated nucleic acid fragment of Claim 1
wherein the nucleic acid identity is 90% or greater to
SEQ ID NOS:1, 4, 6, 8, 10, 12, 14 or 16.
4. An isolated nucleic acid fragment of Claim 1
wherein said fragment is isolated from a plant selected
from the group consisting of soybean, oilseed Brassica
species, Arabidopsis thaliana and corn.
5. A chimeric gene capable of causing altered
levels of linolenic acid in a transformed plant cell,
the gene comprising a nucleic acid fragment of any of
Claims 1, 2, or 3, the fragment operably linked to
suitable regulatory sequences.
6. Plants containing the chimeric genes of
Claim 5.
7. Oil obtained from seeds of the plants
containing the chimeric genes of Claim 5.
8. A method of producing seed oil containing
altered levels of linolenic (18:3) acid comprising:
- (a) transforming a plant cell of an oil-
producing species with a chimeric gene of Claim 5;
- (b) growing fertile plants from the
transformed plant cells of step (a);
- (c) screening progeny seeds from the fertile
plants of step (b) for the desired levels of linolenic
(18:3) acid; and

(d) processing the progeny seed of step (c) to obtain seed oil containing altered levels of linolenic (18:3) acid.

9 The product of the method of Claim 8.

5 10. A method of Claim 8 wherein said plant cell of an oil-producing species is selected from the group consisting of Arabidopsis thaliana, soybean, oilseed Brassica species, sunflower, cotton, cocoa, peanut, safflower, and corn.

10 11. A method of breeding plant species producing altered levels of linolenic acid in the seed oil of oil-producing plant species comprising:

(a) making a cross between two varieties of oil-producing species differing in the linolenic acid
15 trait;

(b) making a Southern blot of restriction enzyme digested genomic DNA isolated from several progeny plants resulting from the cross of step (a); and

(c) hybridizing the Southern blot with a
20 radiolabelled nucleic acid fragment of Claim 1.

12. The product of the method of Claim 11.

13. A method of RFLP mapping in a genomic RFLP marker comprising:

(a) making a cross between two varieties of
25 plants;

(b) making a Southern blot of restriction enzyme digested genomic DNA isolated from several progeny plants resulting from the cross of step (a); and

(c) hybridizing the Southern blot with a
30 radiolabelled nucleic acid fragments of Claim 1.

14. A method to isolate nucleic acid fragments encoding fatty acid desaturases and fatty acid desaturase-related enzymes, comprising:

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(a) comparing SEQ ID NOS:2, 5, 7, 9, 11, 13, 15 and 17 with other fatty acid desaturase polypeptide sequences;

(b) identifying the conserved sequence(s) of 4 or more amino acids obtained in step (a);

(c) making region-specific nucleotide probe(s) or oligomer(s) based on the conserved sequences identified in step b; and

(d) using the nucleotide probe(s) or oligomers(s) of step c to isolate sequences encoding fatty acid desaturases and fatty acid desaturase-related enzymes by sequence-dependent protocols.

15. The product of the method of Claim 14.

16. The isolated genomic DNA of Arabidopsis thaliana identified by accession number ATCC 75167.

17. An isolated cDNA clone which encodes for soybean delta-15 desaturase, the clone designated pXF1 comprising the DNA sequence of SEQ ID NO 10 and identified by accession number ATCC 68874.

18. An isolated cDNA clone which encodes for oilseed Brassica species delta-15 desaturase, the clone designated pBNSF3 comprising the DNA sequence of SEQ ID NO:6 and identified by accession number ATCC 68854.

19. An isolated Polymerase Chain Reaction Product for Zea mays delta-15 desaturase, the clone designated pcr20 comprising the DNA sequence of SEQ ID NO:14.

ADD B1

ADD D3